1: Petrullo E-3 (1933-34) 1939 SS19 Yaruro SS19

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not allowed to the neighboring peoples, such as the Otomacos or the Achaguas. The social and linguistic bonds seem to be strong enough to cause the Yaruros to recognize themselves as a distinct people.

FOODS

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In the llanos food is not plentiful except in and along the rivers; but the foraging activities of the Yaruros are restricted to the banks of the Capanaparo and Sinaruco Rivers for another reason. The hunting of land animals has practically stopped for fear that they will be accused by the ranchers of killing cattle. In recent years the activities of the crocodile hunters have ruthlessly destroyed the game, and since such hunters live on the country they have consumed a portion of the available quantity of game on which the Yaruros depended for a livelihood.

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In the dry season game is concentrated along the rivers and the water holes. It is considerably easier to hunt it then than in the rainy season, when it is dispersed over the plains. The turtle, which is found in great quantities in the waters of the Orinoco and its tributaries, suffers a yearly mass hunt and destruction which has its effect on the food supply of the Yaruros. It has been discovered that the turtle fat and eggs will produce a fine grade of oil which sells for a high price. The result is that the breeding grounds of the turtles become yearly a scene of great activity and destruction. No one knows how many thousands of turtles and turtle eggs are gathered and converted into this oil late in the month of April.

[237]

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The meat staple of the Yaruros is the *Crocodilus babu*, a small crocodile which grows to about 6 feet long. This animal is hunted daily and eaten in its entirety. Its meat is esteemed above that of any other animal. On the other hand, the cayman, sought for its hide, is not hunted as a rule by the Yaruros. Perhaps this meat is not as savory as that of the babu, but the Yaruros give the reason that the large crocodile represents a race of mankind to which they are related. So that although occasionally it may be hunted for the price that its hide may bring, it is never eaten and never hunted consistently.

[825]

Next to the crocodile, turtles, including the matamata and tortoise, are to be found broiling over the fires in every Yaruro camp, and if they are not broiling they can be seen in shallow pools of water with their forelegs tied to their hindlegs. In this way they can keep alive but cannot walk away. The armadillo is seldom obtained and other meats appear occasionally on the diet of the Yaruros. Fishing is resorted to when neither crocodiles nor turtles are obtainable. The caribe, which is the piranha of Brazil, is esteemed but little. The tonino, which can be seen gracefully playing in the water or can be heard snorting in the rivers at night, is never hunted. It also is

[226]

1: Petrullo E-3 (1933-34) 1939 SS19 Yaruro SS19

of the beasts it is necessary to shoot it with a barbed arrow whose head becomes detached from the shaft but remains attached to the latter by a string. The babu will make for deep water and submerge, but the shaft will float on top, and the beast is drawn to the surface by its means, to be dispatched by another arrow or by a knife blow.

The technique for hunting turtles is similar but its execution is more difficult, due to the smaller size of the turtle. These generally can be seen floating on the water with their heads held erect above the surface.

Fishing is done mostly with bow and arrow. The hunter stands up on the prow of the canoe which is guided into the proper position by his companion paddling in the stern. When the hunter is almost over the fish he shoots his arrow some inches in front so as to allow for the deflection caused by the water.

Deer is seldom hunted since the Yaruro shun the land for fear that they may be accused of killing cattle. Unless the deer is caught on the river bank in the early morning or in the evening it is stalked. The hunter fixes his gaze on the deer and moves forward a few feet at a time, stopping stock still at the slightest sign of alarm on the part of the deer. In this way he can approach to within arrow range. This technique takes great patience and time. The hunter may camouflage himself by painting his torso white and pasting feathers on it. He wears a mask in imitation of the jivaro stork, which consists of a black head and beak and a red collar around the neck. He may use the beak of the jivaro or substitute his bow for it. Mimicking the motions of the jivaro, he approaches the deer. When he is close enough he waits for the deer to look up, when he transfixes it with an arrow. The arrow used is so heavy that it cannot be launched from afar.

In addition to these, the armadillo, the tortoise, and the chiguire are hunted. The hunter does not fail to gather turtle eggs, crocodile eggs, and honey as he roams along the river banks.

FOOD GATHERING

It is the task of the women to gather supplementary food. They organize their own expeditions. Armed with digging stick and baskets and accompanied by the children, they roam the plains, digging up the changuango, the barbaco, and the chigua.

MATERIAL CULTURE

In material culture the Yaruros are poverty stricken. Their nomadic existence limits their possessions to what they can carry with them in their canoes, which is very little. The whole range of objects made or possessed by the Yaruros consists of canoe, paddles,

1: Petrullo E-3 (1933-34) 1939 SS19 Yaruro SS19

511 bow and arrows, digging sticks, baskets, small hammocks, a water jar or two, a mortar and pestle, several fishhooks, fire sticks, and scraps of clothing. As a rule, each family will possess the minimum of these objects.

501 [313] CANOES.—A typical Yaruro canoe measured about 18 feet long. Its longitudinal cross section was as shown in plate 16, *3*. It was made of the "salao" wood.

501 322 The only tools that the Yaruros have to fashion such a canoe are crude machetes, perhaps an ax, and fire. The canoes are never regular in outline and on the whole are rather crude. Both bow and stern end in a point and the bottom is round. These canoes are unstable, difficult to maneuver, and will split easily. No crosspieces are used to reinforce the canoe.

PADDLES.—Paddles are of two types, as shown in figure 16. The large paddles measure about 4 feet in length; the smaller paddles slightly over 3 feet. They are as crudely fashioned as the canoes and increase the difficulties of paddling.

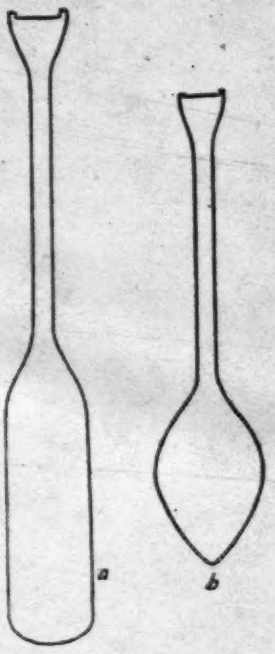

FIGURE 16.—Paddles. *a*, Type usually used by stern paddler. *b*, Generally used in the bow.

411 [313] BOWS.—The bows are fashioned from macanilla or the mahaguillo wood. A large bow will measure about 6 feet, but most of them are closer to 5 feet. The inner surface of the bow is generally flat and the outer is curved. The greatest width on one such bow was about 1½ inches and its thickness less than 1 inch. When the string is relaxed these bows are perfectly straight. They are not reinforced unless they show signs of splitting. On the whole, these bows are inferior to those made by many other tribes in South America. The bow string is tied as shown in figure 17, *e*, *f*, *g*,[1] with three clove-hitch knots.

[284] 411 ● 226 237 ARROWS.—The Yaruros, like most other South American primitives, have a variety of arrows, each type being designed for a specific purpose. A fish arrow consists of a reed shaft to which is attached a bone point with resin and string. Often the upper end of the bone point will protrude away from the shaft to form a small barb. Three feathers are used and fastened as shown in figure 18, *f*, *j*, *k*.[2] At the feathers' end of the arrow a notched piece of Brazil-wood is inserted.

A somewhat similar arrow with an iron point is made. In this case the point is inserted into a worked piece of wood which, in turn,

1 [See category 116, p. 205. --- Analyst]
2 [See category 116, p. 206. --- Analyst]

1: Petrullo E-3 (1933-34) 1939 SS19 Yaruro SS19

411 226 237 is inserted into the reed shaft (fig. 19, *a*, *f*). The barb on the iron point is obviously more effective than on the bone point.

225 For crocodiles the arrow point is always of iron, barbed and detachable. Its length is considerably less than the other, measuring about 4 feet or less. A string about 30 feet long is attached to the point and wrapped tightly around the shaft. When the point strikes the animal the string becomes unwound and if the animal dives into the water the hunter can trace it by the shaft floating on the surface. He then proceeds to pull up the animal.

411 224 For deer and chiguire, land animals, a broad iron blade is used for the point, so heavy that one would suppose it would be a lance head. This is inserted into the shaft and at the point of insertion a crosspiece is fashioned to the shaft so that the point cannot penetrate more than 4 or 5 inches. The reason for this is that the Yaruro is afraid to lose his arrow should he fail to kill the animal and it were to run away. A barbless arrow will tend to fall out of the wound if the animal races away and then the hunter can recover it.

411 223 For birds, the bone-pointed arrows are used and sometimes a special arrow consisting of a shaft with a wooden knob. However, since birds are hunted so seldom there is very little use for special arrows.

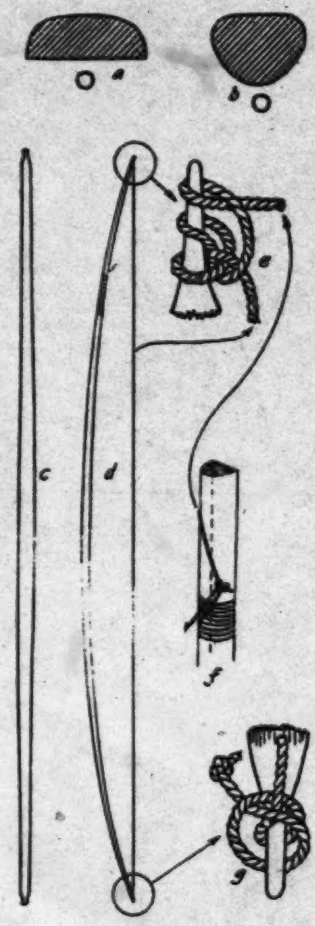

FIGURE 17. — Yaruro bows. *a*, *b*, Cross sections of bows. Circles represent original shape of wood, measuring about 7 cm before it is cut down to shape "a" and "b." *c*, *d*. Yaruro bow. One specimen measured 195 cm in length, 3.2 cm wide in cross section, 2 cm in thickness. *e*, *f*, *g*. Detail of knots on bow string.

411 326 412 The iron points are well made. Each man tries to possess himself of a stone and an iron hammer, but actually in the entire group that I saw, there were only two stones and one hammer. Iron is hard to obtain, and any scrap which comes into their possession is employed either as a knife or an arrow point. The iron is shaped both by hammering and by filing. I saw only one file in the group. At best, it must cause them a great deal of labor to fashion any of these points.

[See category 116, 207 --- Analyst]

1: Petrullo E-3 (1933-34) 1939 SS19 Yaruro SS19

Perhaps that is one reason why no man had in his possession more than three or four arrows—for the most part he had only one of the iron tip kind.

FISHHOOKS.—Most of the fishing is done with bow and arrow, but hooks are known to the Yaruros, and when they are able to obtain strong fine string they employ these hooks. Hooks are not only em-

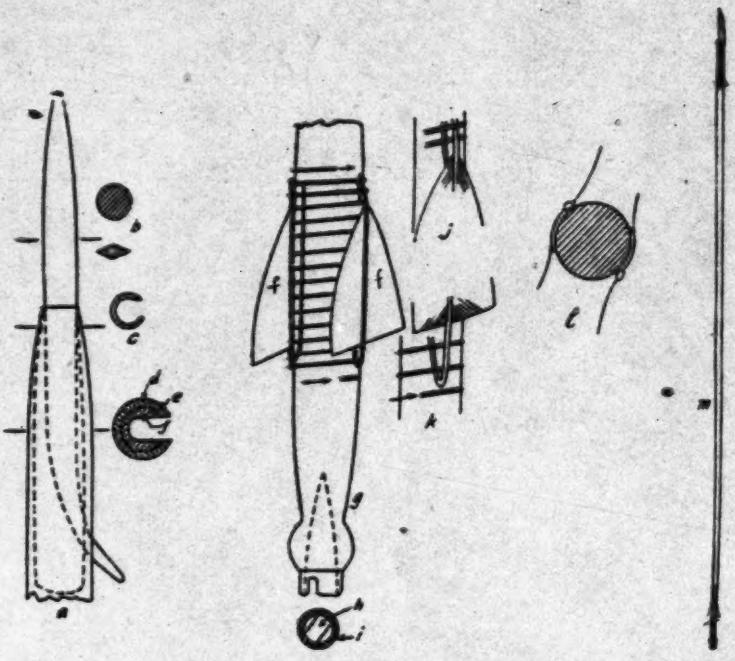

FIGURE 18.—*a*, Bone or iron point attached to shaft. *b*, Cross sections of points; round cross section is of the bone point; diamond-shaped cross section is of the iron point. *c*, Cross section of wax and twine binding. *d*, Cross section of reed shaft. *e*, Cross section of brazil wood to which point is actually fastened. *f*, Feathers. *g*, Butt end of arrow. *h*, Wooden plug nock. *i*, Reed shaft. *j*, *k*, *l*, Method of fastening feather to the arrow. *m*, Fish arrow.

ployed for fish, but even for the chiguire, and sometimes for the crocodiles. The simplest kind is that shown in figure 20, *c*, which may consist of bone or wood. It measures about 6 inches in length. A stronger point of iron or hard wood is used for the manatee. This type is shown in figure 20, *d*. For crocodiles, generally a hard stick sharpened at both ends and baited with a large piece of meat is used. The crocodiles will swallow the stick and, if it is attached to a thick wire, it makes an excellent means of capturing these beasts.

DIGGING STICKS.—Next to the bows and arrows, the most important implement of the Yaruro is the digging stick, which will consist of a wooden handle from 3 to 4 feet long slipped into the handle of an

area is only such in reference to the presence of a given technology. The presence of such a technology is not guaranteed in any particular culture by any historical, evolutionary, geographical, or ecological necessity. Its presence may entail a particular historical explanation or a general evolutionary one. In any case, its absence entails the absence of the use of certain resources whose presence we can observe only in retrospect. 311

Other resource areas besides those utilized because of the presence of horticulture among the Yaruro become available by their possession of hunting, gathering, and fishing technologies, as well as recently acquired animal husbandry in the form of pig-herding. Hunter animals include deer, armadillo, capybara, paca, peccary (?), iguana, and a number of birds (see Table II, p. 4)[1]. These are variously distributed spatially according to the specific ecological niches for which they are adapted. Thus deer are apparently usually found dispersed in the somewhat damper, low-lying savanas where grass is greener and water more available away from the scene of human activity. Armadillo are found distributed throughout the savana. Other species, however, such as the capybara, live near the edge of permanent waters, mainly the rivers. Alligators also live only in the rivers. The faunal carrying capacity of the savanas appears to be quite low in the Cinaruco llanos since foraging foods for larger game animals are sparse. It is important to note that not only is the overall carrying capacity governed by the minimum average food supply of the savanas in the florally more restricted dry season,[1A] but the distribution of animals varies considerably from the wet to the dry season. In the latter, animals tend to cluster nearer the rivers or the widely dispersed water holes. Consequently, the locus of hunting must also shift seasonally (see Maps)[2]. Savana hunting techniques are neccessarily different from those used in procuring food in the rivers, whether hunting alligators or capybara, or, of course, fishing. There is some seasonal variation in the locus of fishing, too, although this is much less marked on the Cinaruco than on the freely-flooding streams of the flatter, more north-easterly savanas of the Apure llanos. In the rainy season, fish move up the larger streams into somewhat shallower waters where more plant and insect food is available to them. However, they are apparently unable to move up smaller streams which often have rapids-like stretches interrupting their course. Thus fishing in the rainy seasons is directed towards the larger creeks and away from the smaller creeks and the river itself, where the water has become too deep for successful fishing since the fish are scarcer and more difficult to see in the deep, swift currents of winter. In respect to animal husbandry, recently introduced pigs are pastured anywhere in the savanas but preferably next to the village or quite a distance from it, in either case far from the nearest gardens (Sp. *conuco*, Y. *tadó*), an effort which is rarely successful, since the pigs, in their wisdom, are among the main predators on the garden crops. Gathering may be carried out in the dry or the wet savana depending upon the plant food to be gathered, or it may be carried out near the creeks especially for the fruit of the moriche palm. The rivers do not appear to be used in gathering.

224 137 [221] 226 133 231 [241] 222

[1A] [See pp. 35-37, category 116 --Analyst]
[1B] [See pp. 40-41, category 102 --Analyst]
[1?] [for footnote, see p. 42, category 116 --Analyst]

Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food M	Prep. F	Q
'cɛzamc''kwɛ	flame	yams	swiddens, dibble	✓?	✓?	✓	✓	✓✓	/		✓✓	2
ôa''ri	batata	sweet potato	as above	✓?		✓?	✓	✓✓	/		✓✓	2
ô	ananá	pineapple	swiddens, dibble				✓	✓			/	1
ia	espacho	?	swiddens, ?				✓?	✓			1	?
cɛ'da(=cɛda''dakwɛ	ocumo (yauta)	xánthosoma	swiddens, dibble	✓?		✓	✓	✓			✓	2
(ôô'tɛa''nâ	aji	chili pepper	doubtful if raised on Cinaruco)									
FISHES CAUGHT:												
yagu'pe	agua dulce	?	rivers, caños, hooks, arrows	✓				✓		/	✓	2-
ɛ(='chamachi''ro)	cachama	?	rivers, hooks, arrows	✓				✓		/	✓	1
gui'tɛ	sardina	?	rivers, fish arrows, small hook	✓	✓	✓	✓	✓		/	✓	2
dap'we	guavina	?	caño · fishhooks	✓			✓	✓		/	✓	?
ho'nô	palambre	?	rivers, caños, arrows, hooks	✓?		✓	✓	✓		/	✓	2
ip:'â	pinte tigre	?	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2-
pa'chowín''ti	bagre	catfish	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2-
'meô''dakwɛ	viejita	?	as above	✓	✓	✓	✓	✓		/	✓	?
'chûûnda-''yii	"	?	as above	✓	✓	✓	✓	✓		/	✓	?
ainda'ô	"	?	caños, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?
ɯji'ri-ka'Rà	" negra	?	caños, hooks	✓	✓	✓	✓	✓		/	✓	?
u'ru-u'ru	de tierra	?	rivers, hooks	✓	✓	✓	✓			/	✓	?
da'rɛ	pavon	?	rivers, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?

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[p. 33]

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food Prep. M	Prep. F	Q
cho'me	-	?	rivers, caños, hooks, sardine bait, from platform	✓				✓		/	✓	?
'yaha'ru	-	?	as above, also arrows	✓	✓	✓	✓	✓		/	✓	2?
Yopok'e"ne	- colorado	?	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	?
šš	caribe blanco	white piranha	rivers, arrows, hooks with especially heavy cord	✓				✓		/	✓	1
(hšde'cia	caribe	piranha	doubtful if caught on Cinaruco)									
(pu'pu	cajarro	catfish	doubtful if caught on Cinaruco)									
FRUITS, ROOTS, AND SEEDS GATHERED:												
t'o'cho	?	?	in mata from big tree, at foot	✓				✓				1?
gu'te (cho'nš)	guayaba	guava	bushes and low trees, distant			✓		✓				1
t'u	fruta de moriche	miriti palm fruit	near caños in wet savana, from foot of trees			✓✓		✓			✓	2
'uum"be	?	?	?, from big tree (monte?)			✓		✓		1	?	
um'be	?	?	?, ?			✓						1
uu,e'ui	cardón	teasel (?)	?, from tall trees (prob monte)			✓		✓				1?
šukai'cho	cacalto	?	?, ?			✓						1?
šuri"u	?	?	?, ?			✓						1?
ya'hod,	tolumo	calabash	monte (?), picked				✓	✓?			✓?	3
ai'p,	changuango	?	wet savanas, digging stick	✓					✓✓		✓	3
cho'kai	guapo	?	monte, savana, digging stick	✓	✓	✓	✓		✓✓		✓	2

222 the moriche palm (*Mauritia flexuosa*); several seeds, notably chiga (= chigo?; — *Campsiandra comosa*); calabashes (*Crescentia Cujete*), and bees' wax and honey. Non of the items gathered are large in size or difficult of access except the bees' wax, one or two of the fruits, and calabashes which grow on higher trees, or may be very far. Gathered foods may be picked up by hand or with the aid of a digging [412] stick or machete, and may be brought back in the harvesting baskets. Other items [415] which may be gathered include the raw materials for baskets and mat-making or 824 for food-processing tools such as the tipití, pots, or mortars and pestels. These [285] items include the fronds of the moriche palm, used for making cord, baskets, tipi- [323] tís, mats, and sacks; in some villages, clay for pots; reeds for arrows, wood for house beams, mortars and pestles, bows, and for cooking utensils. Wood, palm fronds, and many other items are gathered with the help of the all-purpose machete.

231 Pig herding is unsystematically done. The pigs, a recent acquisition, spend most of their time at will in the foraging grounds. The significant herding activity occurs only at times when one or another of the groups of pigs breaks into the gardens, an almost daily occurrence. They are then driven to the foraging grounds again, or if late in the day, into a close till morning when they are either driven forth again or allowed to scavenge in the village. There are several herds of pigs of sizes varying from perhaps a maximum of 20 including piglets to the more usual six or eight animals. The only tools used in pig care include a slaughtering [412] stick with which the pig is clubbed to death and knives to cut up the meat. The [262] close is built of logs cut with a machete and carried in by one or two men. Pig meat, though eaten with regularity, is definitely a secondary element of diet.

411 Hunting is done almost exclusively with the bow and arrow. There are several types of arrows. One for fish has a metal point approximately 4 inches long with a side hook about five inches from the tip, where the tip is set into the shaft. This may also be used for smaller animals. One for birds has a blunt wooden head, and does not appear to be used very often. A third type is used for larger animals such as deer and capybara. It has a blade about 6 inches long shaped like a laurel leaf and, at present, made of steel. At the base of the blade, a small cross-piece is affixed in order to prevent the precious blade from piercing so deeply into the animal that, if it escapes, it would carry the arrow away with it. The fourth type of arrow is used for turtles, tortoises, and alligators or other animals which submerge. The head is short and strong with a sharp recurved hook. The entire metal head is attached to a cord, and this in turn is attached to the arrow shaft, from which the head is detachable. On detaching, the shaft floats and the game can be followed in its underwater course. The bow is generally about 6 feet long or a little more. It is made rather crudely of the wood of the macanilla palm (*Bactris Gaspiaes*). Some animals, especially land tortoises and armadillos, may be caught [136] by hand. Alligators may also be hunted with exceedingly heavy steel hooks and [224] a strong line. In hunting, no traps, nets, surrounds, or drives are used.

226 Fishing is done chiefly with bows and arrows, though an arrow may sometimes be used as a spear, repeatedly jabbed into grassy waters near the river banks. Fishing may also be done with hooks and lines of different sizes. Bait is also used. A man may fish from a platform built by lashing logs horizontally to two trees

and then shooting into the still side pools of a stream into which he has driven a post with bait attached. He may also stand in a canoe to shoot. It is reported, though I have not myself seen it, that barbasco (*Jacquinia revoluta* or *mucronulata*) poison is used by some Yaruro.[12] No nets, weirs, traps, sweeps, or artificial fish pools are used.

Given the techniques and tools of the Yaruro, all the subsistence activities described can conveniently be done by one person. Some *must* be done by one person only, since the tools and techniques themselves do not permit two or more persons to operate jointly. As it were, the logic of the tools and techniques concerned demands utilization by single persons.[13] Some of the tools and techniques might conveniently involve two or more persons, e. g. lashing tree trunks together to make a fence or cornering a capybara, but do not definitively *require* more than one person. Activities of all sorts may be done by aggregates of persons, each utilizing his own tools and techniques individually but neither the activity, the tools nor the techniques entail the aggregation of individuals. Thus, from the point of view of human organization, the technology, by itself, entails no managerial functions, no coordination of tasks which must be overseen by someone occupying an appropriately defined status.[14] That is, there are no technologically determined positions of leadership in Yaruro society. Further, the technology as such entails no significant cooperation in work organization, even when this is convenient, and correspondingly, no standard work groups or management functions, as represented in some defined status, for facilitating cooperation are to be expected or to be found. In fact, Yaruro technology and resource distribution are such as to elicit considerable dispersion of activities and actors at any given time of work, and to inhibit the development of rank and the personal acquisition of superordinating prestige.

IV

We may now examine the habitat aspect of the ecological relationship. A clearly marked annual cycle occurs in the Yaruro habitat.[15] However, despite a sharp seasonal change from heavy rains up to 60 inches in one half of the year to almost

[12] Personal communication from Mr. Thomas Rootes who has studied Yaruro linguistics for a number of months, having visited several groups.

[13] Different kinds of tools require different kinds of organization. A simple hand saw can be used by only one person at a time. A logging saw, though it can awkwardly be used by one person, is surely best used by two persons. Certain other saws, e. g. jig saws, make up one of a series of machine processes on a single part of a product, the entire series being the unit of operation which requires a still more complex level of organization. Cf. Leeds, 1960 b.

[14] For the structure of argument which is involved here, see Leeds, 1960 b.

[15] 'Habitat' here refers to all physical objects and conditions of the environment which are relevant to the existence or production of resources as defined by the culture. For the most part, then, 'habitat' refers to those environmental conditions such as humidity, temperature, insolation, rainfall, etc., which affect the food supply, as well as the food and water available for animals and plants and other culturally relevant physical objects. By extension, it refers to daily, seasonal, annual, and long-term variations and cycles in the various relevant factors of the environment, whether climatic, geologic, or biotic, which affect any of these supplies.

Gathered resources are found near the streams in marshy places where the moriche palm grows, and to a lesser extent in the savannas.[17] The dry season resources are also distributively located though the pattern is somewhat different. Quanta of production from these resources at any one time are rarely great. The larder, as it were, must be filled from a number of sources at once, even though one crop, particularly bitter manioc, and occasionally sweet manioc and corn, may rise briefly to as much as 50 or 60% of the food supply. Thus the available quanta of resources and their distribution at given moments in time are such as to demand a distributive form of labor organization: workers, as individuals or in very small groups, must go off in different directions at the same time. The obverse of this, of course, is that no sizable or permanent working groups are to be expected and none in fact occur. Further, because a dispersion of the labor force and a constant flux in the constitution of work groups is entailed by the relationships between the technology and the habitat, organized and permanent managerial functions can scarcely occur, and no fixed status with significant managerial powers would be expected. The observed data of leadership among the Yaruro and many other tribes in South America and other parts of the world, such as Melanesia, having fundamentally similar ecologies, corresponds precisely with what one is led to expect logically from the form of the ecology.

The absolute size of work groups achievable in the Yaruro habitat is limited not only by the dispersed locations and temporal harvest patterns of resources, but also by the absolute productivity of the ecology. If one calculates the distribution per land area of those calories potentially convertible to human energy, the rate of calories per unit of land surface is so low that even at maximum utilization only a very low population density of about 2 persons per square mile would be possible. If concentrated in the center of an effective walking distance for exploiting resources of, say, six miles radius from a village, with a resultant total area of about 110 square miles, there would be about 220 souls. Of these, perhaps 70% (all persons over age 10), at maximum, might constitute the labor force, i. e. 154 adults and older children. The actual conditions are, of course, much more limiting, since the efficiency of the technology is such that it cannot exploit the totality of calories potentially available for conversion to human energy at any one time.[18] The actually harvested calories are considerably less, though I have no estimates as to how much less. Let us estimate half, or enough to support one person per square mile, that is, 110 persons. With a somewhat smaller per cent of the population available for the labor force, say 60% of the 110, the force would have only about 67 persons at most. This appears to be a reasonable number for the Cinaruco Yaruro groups, although due to depopulation from disease and mas-

[17] *Ibid.*, Map I.

[18] *Ibid.*, Map II.

[19] For example, all the fish available in the streams at a given time cannot be caught. More could be caught with an improved technology, such as the use of fish traps, weirs, or fish poisons, which, as we have said, are absent from the technology of the Cinaruco Yaruro. Density of fish, or any other biotic population, can be estimated (cf. Diez, 1952, Ch. IV), and then compared with rates of harvesting. Furthermore, it should be noted that often the totality of an actually harvested resource may not be available. For example, in

7: Leeds E-4, 5 (1958) 1964 SS19 Yaruro SS19

B) Petrullo restricted his visits to the sand banks along and in the river, and, after his first arrival, most of his travelling was done on the streams. Gardens are never to be found on the sand banks and bars, but rather, usually, on the affluent creeks which are just above flood level of the rivers in the rainy season. Therefore he was not in a position to see the gardens which Le Besnerais later saw in the same area when he explored back from the river.

C) Petrullo was in the llanos in the dry season when the Yaruro move nearer the rivers both to secure a water supply as the water table lowers and to avail themselves of the much more plentiful and accessible river fauna[1] at a time when vegetable harvests are reduced because of drought. He was therefore observing dry-season subsistence — and perhaps only a part of it.

D) The probability that he observed only a part of the dry-season subsistence pattern in his area is reinforced by two considerations:

1) He reports the fact that 150 Yaruro had been massacred by Venezuelans a month before his arrival (p. 181). Their response under such circumstances is, as fast as possible, to get off the land that the Venezuelans want and to move to the rivers. I myself had occasion to observe such a diaspora, occurring in response to a smaller massacre. In view of this sort of response, it is likely, therefore, that Petrullo's group was living off river resources and away from their gardens at the time of his visit.

2) Maps indicate that in the lower part of the Capanaparo River, the flooding is greater and the number and size of side creeks suitable for horticulture is smaller than upstream on any of the large rivers. In other words, the available area for garden plots is much smaller, and riverine subsistence proportionately more important. Upriver, and more especially on the Sinaruco and on the middle and upper Cunaviche and Arauca rivers, there is much more tillable ground.

"I thought you said you could not sing and were not a musico?" "Yes, that was true last week when I had the grippe, but now my grippe is better I can be a musico again." And many similar examples of the extreme caution one needed to exercise regarding negative responses in order to be sure they were not merely descriptive of the place and moment. If Petrullo asked "Do you raise crops?", his informants would most likely have said, "No, we have no crops here", under the circumstances in which he found them.

[1] The river fauna is more plentiful and accessible in dry season because, first, it is more concentrated, and, second, it is more visible. During the wet, flooding season, fish, and other animals spread even into smaller streams and out upon the watery llanos — we caught a small piranha on the grassy, watercovered plain itself. On the plains, the fish are lost among the grasses and are virtually impossible to spear or shoot with bow and arrow. The river turbulence of the rainy season, meanwhile, has brought so much mud from further upstream that many of the rivers are opaque, especially in those parts of the llanos constructed of mud rather than sandy soils. Fish and the water reptiles and mammals are well-cloaked by the murky stream. The waters and the plains clear in the dry season so that the fish are concentrated in the limpid, grassless waters of the rivers, while land animals and riparian fauna are all crowded together near the banks in their search for food and water.